

mm mixes with optimum and optimum minus 0.5% AC, respectively. The figures show a fairly consistent trend, i.e., the lower the air void content, the higher the axial dynamic stiffness is.

5.4 Analysis of axial stiffness

This section deals with analysis of axial stiffness data. The sensitivity of axial stiffness to various mix and test parameters is investigated using statistical analysis, and surrogate models are developed for the prediction of axial stiffness and axial loss stiffness. The models presented herein, as well as in the following sections were utilized for the development of fatigue models and pavement analysis and design for the fatigue distress.

5.4.1 Surrogate models for axial stiffness

The axial stiffness model development procedure followed was similar to that used for fatigue characterization. The models presented in this section are the general models for axial stiffness $|E^*|$, axial loss stiffness E'' , and axial stiffness $|E^*|_{10Hz}$ at 10 Hz frequency.

Table 5-2 through Table 5-4 provides summary of regression analysis results for the various models. The axial stiffness models based on GLM are as follows:

At 10 Hz frequency:

$$|E^*|_{10Hz} = 17.5153 \times 10^5 \exp(0.03956AC + 0.01256GR - 0.31472Temp - 0.11671V_a) \quad R^2 = 0.94 \quad (5.2)$$

For variable frequency:

$$|E^*| = 9.9535 \times 10^5 \exp(0.08946AC + 0.0368GR - 0.46242Temp - 0.15345V_a) \cdot (Freq)^{0.35152} \quad R^2 = 0.96 \quad (5.3)$$

$$E'' = 5.7278 \times 10^5 \exp(0.09032AC + 0.20616GR - 0.41168Temp - 0.13566V_a) \cdot (Freq)^{0.35152} \quad R^2 = 0.91 \quad (5.4)$$